ARARs Q's and A's:
Compliance with Federal Water Quality Criteria

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Quick Reference Fact Sheet

Section 121(d) of CERCLA, as amended by the 1986 Superfund Amendments and Reauthorization Act (SARA), requires that on-site remedial actions must at least attain Federal and more stringent State applicable or relevant and appropriate requirements (ARARs) upon completion of the remedial action. The 1990 National Contingency Plan (NCP) requires compliance with ARARs during remedial actions as well as at completion, and compels attainment of ARARs during removal actions whenever practicable. See NCP, 55 FR 8666, 8843 (March 8, 1990) (to be codified at 40 CFR section 300.414(i)), and 55 FR 8666, 8852 (March 8, 1990) (to be codified at 40 CFR 300.435(b)(2)).

To implement the ARARs provision, EPA has developed guidance, CERCLA Compliance With Other Laws Manual: Parts I and II (Publications 9234.1-01 and 9234.1-02), and has provided training to Regions and States on the identification of and compliance with ARARs. These "ARARs Q's and A's" are part of a series of Fact Sheets that provide answers to a number of questions that arose in developing ARAR policies, in ARAR training sessions, and in identifying and complying with ARARs at specific sites. This particular Q's and A's Fact Sheet addresses compliance with Federal Water Quality Criteria (FWQC) as ARARs.

Q1. What are the Federal Water Quality Criteria?

A. Federal Water Quality Criteria (FWQC) are nonenforceable guidance established by EPA for evaluating toxic effects on human health and aquatic organisms. FWQC are used or considered by the States in setting their water quality standards (WQSs) for surface water. State WQSs consist of designated uses (i.e., fishing, swimming, drinking water) and criteria for pollutants set at levels that are protective of those uses. State WQSs are regulatory requirements, and permit limits are established to ensure that the State use designations and criteria are met.

There are two categories of FWQC that relate to human exposure:

- Ingestion of contaminated drinking water and contaminated fish; and,
- Ingestion of contaminated fish alone.

FWQC have been published for many different contaminants (both noncarcinogens and carcinogens). FWQC for noncarcinogens are generally set above zero, and address chronic and toxic effects. FWQC for carcinogens are recommended at zero, although a range of concentrations corresponding to incremental cancer risks of 10^{-5}, 10^{-6}, and 10^{-7} are provided for informational purposes and do not represent an Agency judgement on an "acceptable" risk level.

In addition to the FWQC published for two human exposure scenarios, FWQC are published for four other categories. They consist of acute and chronic toxicity for fresh and saltwater aquatic life.

Q2. Do FWQC constitute potential ARARs for Superfund sites?

A. Yes. Although compliance with FWQC is not legally required at non-Superfund sites, and they are not "legally applicable" requirements under CERCLA, FWQC may be ARARs when found by the Agency to be relevant and appropriate (see final NCP preamble, 55 FR at 8742 (March 8, 1990). Specifically, CERCLA section 121(d)(2)(A) states that every remedial action "shall require a level or standard of control which at least attains ... water quality criteria established under section 304 or 303 of the Clean Water Act, where such ... criteria are relevant and appropriate under the circumstances of the release or threatened release."

Q3. When are FWQC best suited to serve as cleanup standards?

A. FWQC for specific pollutants should generally be identified as ARARs for surface-water cleanup if

particular circumstances exist at the site that FWQC were specifically designed to protect, unless the State has promulgated WQSs for the specific pollutants and water body at the site. Standards that are specifically suited to site circumstances should generally be used to establish cleanup levels at sites where those circumstances are present.[1] A State WQS may be a site-specific adaptation of a FWQC. In such cases, they are generally the appropriate standards for the specific pollutant and water body, rather than the FWQC. In the absence of any State WQSs specific to the pollutant and water body of concern, FWQC may be ARARs for surface-water bodies when:

- Protection of aquatic life is a concern. Examples include sites where:
  - adverse impacts to aquatic life are foreseen at the site; or
  - the surface-water bodies are designated for the protection of aquatic life.
- Human exposure from consumption of contaminated fish is a concern.

For sites where protection of aquatic life is a concern, the FWQC for fresh or saltwater aquatic life (whichever is pertinent) may be ARARs. When human exposure from consumption of contaminated fish is a concern (e.g., sites that require remediation of recreational water bodies, saltwater bodies, or estuaries used for fishing), the FWQC published for human exposure from consumption of fish may be ARARs for the sites. Examples include sites where the surface-water bodies are used for fishing and an exposure route consists of consumption of contaminated fish from the site.

Note, however, that if any of the above-mentioned water bodies are also used for drinking, standards for acceptable levels of contaminants in drinking water may also be potential ARARs for the site (e.g., non-zero maximum contaminant level goals (MCLGs), maximum contaminant levels (MCLs), State WQSs designated for drinking-water use, and FWQC adjusted to reflect cleanup standards for drinking water). (Question #5 of this fact sheet addresses how to determine the ARAR in these situations, when there are both drinking-water and environmental concerns at the site.)

Q4. Should FWQC be used to set drinking-water cleanup levels for surface water at sites that do not present environmental concerns?

A. Rarely. FWQC should be used to set drinking-water cleanup levels only when surface water serves as an actual or potential drinking-water source and other cleanup standards for drinking water (e.g., non-zero MCLGs, MCLs, or State WQSs designated for drinking-water use) are not available. (see Question 5 if impacts to aquatic organisms have also been identified at the site). Where surface water serves as an actual or potential drinking-water source and there are no impacts to aquatic organisms, the following requirements, where relevant and appropriate, should be attained in the following order:

- State WQSs that are designated for drinking-water use, and are more stringent than MCLs or non-zero MCLGs, or specific to the uses of that water body; or, if none,
- Non-zero MCLGs; or, if none,
- MCLs; or, if none,
- FWQC adjusted for drinking-water use.

Q5. Should FWQC be used to set drinking water cleanup levels for surface water at sites that do present environmental concerns?

A. It depends. Generally, non-zero MCLGs or MCLs should be identified as the ARARs for cleanup of water that is or may be a potential source of drinking water. However, at sites that also present environmental concerns, RPMs should compare the stringency of the non-zero MCLGs or MCLs to the pertinent FWQC for aquatic life at the site. If the FWQC for the aquatic life are more stringent, they may be the relevant and appropriate requirements to meet at the site. For example, the levels needed to protect aquatic organisms from volatile organics are generally much less stringent than the levels needed to protect human exposure from drinking water. Therefore, non-zero MCLGs or MCLs would adequately protect both humans and most aquatic life from volatile organics. However, the levels needed to protect aquatic life from metals are more stringent than those levels required to protect human exposure from drinking water. As a result, the FWQC for aquatic organisms would protect both humans and aquatic life from metals, whereas non-zero MCLGs or MCLs may not.

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[1] See proposed NCP preamble, 53 FR at 51442 (Dec. 21, 1988), and the final NCP preamble, 55 FR at 8755 (March 8, 1990). NOTE: the guidance set out in the proposed NCP is still effective where not superseded by guidance or regulations in the final NCP. See 55 FR at 8666, col. 3.

Q6. Should FWQC be used to set cleanup standards for ground water?

A. Rarely. FWQC should be used to set cleanup standards for ground water only if the ground water is a current or potential source of drinking water, and other cleanup standards for drinking water (such as MCLs and non-zero MCLGs) are not available. If FWQC are used to set cleanup standards for ground water, the FWQC should first be adjusted for drinking-water use (as discussed in Question 7). Note: the issue becomes more complicated at sites where the ground water flows into the surface water. Where the ground water flows naturally into the surface water, the ground-water remediation should be designed so that the receiving surface-water body will be able to meet any ambient water-quality standards (such as State WQSs or FWQC) that may be ARARs for the surface water. This means that the FWQC should be considered when establishing cleanup levels for the ground water at those sites, but they are not necessarily ARARs for the cleanup of ground water. At sites where the discharge from a ground-water treatment facility will be deposited into the surface water, the discharged water will have to meet all effluent limitations found in the applicable State National Pollutant Discharge Elimination System (NPDES) permits, rather than the FWQC. (The NPDES effluent limitations will assure compliance with State WQSs.)

Q7. What is required to develop cleanup levels based on FWQC for human exposure from drinking water alone?

A. In those rare circumstances where the FWQC will be used to establish cleanup levels for drinking water, RPMs must adjust the original equation used to develop FWQC for human exposure from both ingestion of contaminated drinking water and contaminated fish. When adjusting the FWQC to develop cleanup standards for human exposure from drinking water alone, RPMs should use the standard exposure assumptions (i.e., 2 liters of water, 6.5 grams of edible aquatic products, and an average body weight of 70 kg), unless data are available indicating that the standard exposure assumptions are not pertinent to the area in which the site is located (see **Highlight 1**). Note, however, that adjustment of the FWQC for drinking is not simply a matter of sub-tracting one FWQC from another.

While it is possible to derive cleanup levels for drinking water from FWQC, FWQC were not intended to be used as drinking-water cleanup standards, since no criteria are provided for human exposure from ingestion of water alone. Moreover, the values derived from the FWQC (in contrast with those derived from MCLs and MCLGs) do not reflect the contribution of other sources through an apportionment factor. Therefore, FWQC may be less useful as cleanup standards for potential drinking water than the MCL/MCLG drinking-water standards (see proposed NCP preamble, 53 FR at 51442, and final NCP preamble, 55 FR at 8755).

Highlight 1: NONCARCINOGENIC EQUATION

For noncarcinogens, acceptable daily intakes (ADIs) and criteria derived therefrom are calculated from total exposure data that include contributions from the diet and air. The equation used to derive the criterion (C) is:

$$C = ADI - (DT+IN)/[2 \text{ liters} + (0.0065 \text{ kg} \times R)]$$

where:

2 liters is assumed daily water consumption;
0.0065 kg is assumed daily fish consumption;
R is bioconcentration factor in units of 1/kg;
DT is estimated non-fish dietary intake; and
IN is estimated daily intake by inhalation.

The equation for carcinogens is not provided in this fact sheet because FWQC for carcinogens are recommended at zero, and therefore are not ARARs for the Superfund program (see Question #8 of this fact sheet).

Q8. How should EPA comply when FWQC for carcinogens are determined to be potential ARARs?

A. As previously mentioned, the recommended FWQC for carcinogens are set at zero. Consistent with Superfund policy on MCLGs, the zero-value FWQC, since they cannot be measured, would not be considered appropriate cleanup standards and, thus, are not "relevant and appropriate requirements" within the meaning of CERCLA section 121(d)(2)(A) (see final NCP preamble, 55 FR at 8755). Accordingly, they are not ARARs and, therefore, they do not need to be attained or waived.

For the carcinogens, the Office of Water Regulations and Standards (OWRS) has also published for informational purposes three concentration levels corresponding to incremental cancer risks of 10^{-5}, 10^{-6}, and 10^{-7}, respectively. OWRS has expressly stated in the preamble to their FWQC publications that it makes no judgment or recommendation as to which of the three concentrations provides an "acceptable" risk level for carcinogens. Instead, these concentration levels have been provided for informational purposes only and, therefore, simply constitute guidance to-be-considered (TBCs) for the Superfund program. As a result, an ARAR waiver is unnecessary for FWQC published for carcinogens;

Therefore, if these conditions are satisfied, the antidegradation provision should be met.[3]

[Note: If pump-and-treat reinjections fail to maintain the current quality of the aquifer, an interim action waiver could be invoked, assuming the aquifer will be suitable for its current use upon completion of the remediation.]

Scenario #2: Natural Attenuation

Assumption: The ground water is contaminated or, at a minimum, contains a plume of contamination. The ground water is a Class I or II aquifer (which means that it is or may be a potential source of drinking water).

A) **State ground-water antidegradation requirements that prohibit discharges:** These are not applicable to natural attenuation of the ground water because there is no discharge during natural attenuation.

Compliance: The statute is not applicable to natural attenuation, but it may be relevant and appropriate depending upon circumstances at the site (see Question #5 below).

B) **State antidegradation requirements that require ground-water maintenance consistent with its current uses:** These are potentially applicable to natural attenuation.

Compliance: The remedy generally would comply with these requirements during natural attenuation remediation, if the remedy maintains (i.e., does not adversely affect) the current quality of the aquifer. Moreover, it is unlikely that natural attenuation will interfere with the ground water's current uses, since natural attenuation is typically confined to sites where the contaminant level is low, there are small areas of contamination, and the plume will not migrate significantly. Therefore, natural attenuation generally should meet this type of antidegradation requirement.

[Note: Where such requirements are not met, an interim action waiver might be appropriate, assuming the aquifer will be suitable for its current use upon completion of the remediation.]

[3] Here, again, the State may argue that a more limited definition of "current uses" is the only valid interpretation. If so, consult ORC or OGC.

Scenario #3: Soil Flushing

Assumptions: The soil is contaminated. Through soil flushing, contaminated effluent will enter the ground water and then be extracted for treatment. The ground water is a Class I or II aquifer (which means that it is or may be a potential source of drinking water). The aquifer may or may not be contaminated.

A) **State ground-water antidegradation requirements that prohibit discharges:** These are likely to be applicable because the effluent from the soil flushing probably constitutes a discharge. However, the statute is violated only if the discharge constitutes the type prohibited by the statute.

Compliance: If, for example, the statute prohibits discharges injurious to public health, EPA may conclude that soil flushing would comply with it where the receiving aquifer is already contaminated. (A discharge of contaminated effluent into a contaminated aquifer generally would not be "injurious to public health.") Moreover, if pump-and-treat remediation is conducted concurrently with the soil flushing, EPA may conclude that the "discharge" is not injurious to public health because it would be controlled and contained through the pump-and-treat remediation.[4]

[Note: Since it is EPA's goal to restore ground water to its beneficial uses, the Superfund program would rarely propose a soil flushing remedy that would degrade pristine or only slightly contaminated water. Thus, the issue of compliance of soil flushing with an antidegradation standard should rarely be a problem for Superfund ground-water remediations. In rare cases where degradation of a pristine aquifer through soil flushing is necessary, RPMs should invoke the interim measures ARARs waiver.]

B) **State antidegradation requirements that require ground-water maintenance consistent with its current uses:** These presumably are applicable to soil flushing.

Compliance: The remedy generally would comply with these requirements during soil flushing, if the remedy maintains (i.e., does not adversely effect) the current quality of the aquifer. Current quality of the aquifer is maintained if the effluent at least meets current water quality levels of the aquifer. Because soil flushing is generally only considered for contaminated aquifers, these requirements typically may be met.[5]

[4] Again, the State may argue that a more limited interpretation is required. If so, consult ORC or OGC.

[5] State arguments that a more restrictive interpretation of the standard is required should be referred to ORC or OGC.

Highlight 1: KEY FACTORS FOR THE APPLICABILITY OF STATE GROUND-WATER ANTIDEGRADATION REQUIREMENTS TO SOIL FLUSHING

- Whether the State statute is triggered because either the effluent constitutes a "discharge" under the State law, or the State statute requires ground-water maintenance (during CERCLA remediation) consistent with current uses;
- Whether the statute defines "current uses" as present uses or pre-contamination uses;
- Whether the aquifer is pristine, slightly contaminated, or greatly contaminated;
- Whether the effluent has high contaminant levels; and,
- Whether soil flushing will be conducted concurrently with pump-and-treat remediation of the ground water.

Q5. **Are State ground-water antidegradation requirements likely to be relevant and appropriate requirements for remediation that affects the ground water?**

A. It depends upon whether the requirements are well-suited for use at the site. While examples are given below, a more definite answer cannot be given because relevance and appropriateness is a site-specific determination. See section 300.400(g)(2) of the revised NCP. (See the attached matrix for additional examples.)

For example, State antidegradation requirements that are applicable to discharges injurious to public health are potentially relevant and appropriate to all ground-water remediations (whether or not there is a discharge), by prohibiting remediations injurious to public health. These principles, when applied to CERCLA remediations, should be analyzed as follows:[6]

A) EPA does not consider pump-and-treat remediations of a contaminated plume to be injurious to public health because they are generally effective at containing and treating contaminated plumes. (See OSWER Directive 9355.4-03, October 1989, entitled "Considerations in Ground-Water Remediation at Superfund Sites"). Therefore, pump-and-treat remediations would generally comply with these requirements, if relevant and appropriate.

B) Natural attenuation remediation would also be expected to comply with these requirements prohibiting injurious discharges (if relevant and appropriate). Examples include sites where: (1) a contaminated plume is located within a Class III aquifer; (2) a contaminated plume is moving within parts of a Class I or II aquifer that are also significantly contaminated; or (3) the plume is small, its contaminant levels are low, and it will not migrate significantly. Natural attenuation might be said not to comply with these requirements if it allows a contaminated plume to move into a pristine, or only slightly contaminated portion of a Class I or II aquifer; the interim action waiver must be invoked at such sites, and precautions such as institutional controls should be taken.

C) Soil flushing generally would comply with these requirements, if relevant and appropriate, at sites where the aquifer is already contaminated. Contaminants from soil flushing might be said to be injurious to public health if introduced into a pristine, or only slightly contaminated portion of a Class I or II aquifer. In those rare cases where it is necessary to select this remedy at such sites, the interim action waiver must be invoked, and precautions such as institutional controls should be taken.

Highlight 2: COMPLIANCE WITH STANDARDS SET BELOW DETECTION LEVELS

State ground-water antidegradation standards that are set below detection levels cannot be measured or verified. Therefore, if such standards are applicable, the technical impracticability waiver should generally be invoked where compliance with such standards is not possible due to detection limits. Potentially relevant and appropriate standards that cannot be measured or verified may not be appropriate and, therefore, are not ARARs (see Preamble to the revised NCP, 55 FR 8750-8752).

Regions should not extrapolate from existing data or technologies to reach a level set below detection capabilities because such extrapolations cannot be verified scientifically with any degree of certainty. Without verification, neither the Agency nor the potentially responsible parties could legally establish that cleanup goals were met. Furthermore, the NCP states that relevant and appropriate requirements must be measurable and attainable since their purpose is to set a standard that an actual remedy will attain (see Preamble to the revised NCP, 55 FR 8752).

[6] The following reflects EPA's general analysis of how several types of remediation should be evaluated. The State may take a different and more limited view of what was intended under the statute. If the State argues for a different interpretation of its laws, consult ORC or OGC.

Highlight 3: POTENTIAL ARARs WAIVERS FOR STATE ANTIDEGRADATION REQUIREMENTS

The Interim Measure Waiver: This waiver provides that the action selected need not attain an ARAR where the action "is only part of a total remedial action that will attain such level or standard of control when completed." See CERCLA section 121(d)(4)(d). Therefore, the interim measures waiver may be used to waive ARARs for interim measures which, by their temporary nature, do not attain all ARARs. However, the interim measure must be followed by, or be part of, complete measures that attain all ARARs, and it should not exacerbate site problems nor interfere with the final remedy (see the revised NCP, 55 FR 8747-8748 (March 8, 1990)).

The Inconsistent Application of State Requirements Waiver: This waiver is intended to prevent the application to Superfund sites of State requirements that have not been consistently applied elsewhere in a State. State standards are presumed to have been consistently applied unless there is evidence to the contrary. When questioned by EPA, States may provide evidence of consistency of application by demonstrating: (1) the similarity of sites or response circumstances; (2) the proportion of noncompliance cases; (3) reasons for noncompliance; and (4) intentions to apply future requirements (see the revised NCP, 55 FR 8749 (March 8, 1990)).

NOTICE: The policies set out in this ARARs Q's and A's are intended solely for guidance. They are not intended, nor can they be relied upon, to create any rights enforceable by any party in litigation with the United States. EPA officials may decide to follow the guidance provided in this Q's and A's, or to act at variance with the guidance, based on an analysis of specific site circumstances. The Agency also reserves the right to change this guidance at any time without public notice.

MATRIX ANALYSIS OF STATE GROUND-WATER ANTIDEGRADATION REQUIREMENTS AS THEY PERTAIN TO CERTAIN REMEDIES AND SITE CIRCUMSTANCES*

REMEDY/SITE CIRCUMSTANCES

STATE LAW	GROUND-WATER REMEDIATION: PUMP AND TREAT (Aquifer With a Contaminated Moving Plume)	GROUND-WATER REMEDIATION: NATURAL ATTENUATION (Aquifer With a Contaminated Moving Plume)	SOIL REMEDIATION: SOIL FLUSHING (Where the Aquifer May or May Not Be Contaminated -- Followed by Pump and Treat)	SOIL REMEDIATION: SOIL FLUSHING (Where the Aquifer May or May Not Be Contaminated -- Concurrent With Pump and Treat)
1. The ground water must be protected. Discharges that are injurious to public health are prohibited. RAR:** ground-water remediations that are injurious to public health are prohibited. This may arguably occur if a remediation allows a contaminated plume to move.	• Not applicable if there is no discharge. If each reinjection is a "discharge," the requirement is met if the discharge is not "injurious to public health" (e.g., where the receiving aquifer is already contaminated, or if the reinjection has low contaminant levels). It is generally not a RAR if the plume is moving into parts of the aquifer that are also significantly contaminated. If it is a RAR, and it requires some degree of plume containment, we comply with it through pump and treat.	• Not applicable because there is no discharge. It is generally not a RAR if the plume is moving to parts of the aquifer that are also significantly contaminated. If it is a RAR, and it requires some degree of plume containment, we comply with it by limiting natural attenuation to sites where the plume will not migrate to the portions of the aquifer used for drinking and contaminant levels are low, thereby preventing injury to public health. Otherwise, we may use the interim action waiver, usually accompanied by institutional controls.	• May be a discharge; however, the requirement is met if the discharge is not injurious to public health (e.g., because the aquifer already exceeds health-based levels or if the discharge has low contaminant levels). If discharging to a pristine or slightly contaminated aquifer, we may use the interim action waiver.	• May be a discharge; however, the requirement is met if the discharge is not injurious to public health (e.g., because the aquifer already exceeds health-based levels or if the discharge has low contaminant levels). If it is an ARAR, we may comply with it by conducting pump and treat simultaneously, if the discharge (as it is part of a contained treatment system) is not injurious to public health. Otherwise, we may use the interim action waiver.
2. The ground water must be protected. No discharge is permitted unless a State Board issues a permit. RAR:** ground-water remediations must protect the ground water consistent with State permit standards (which may, for example, prohibit the introduction of contaminants into a portion of an aquifer used for drinking).	• Permits are not required (see CERCLA §121(e)(1)). Substantive requirements of the permit program are not applicable if there is no discharge. If each reinjection constitutes a "discharge," the requirement is met if each reinjection meets the substantive requirements of the permitting regulations (e.g., no "harmful" discharge). It is generally not a RAR if the plume is moving to parts of the aquifer that are also significantly contaminated. If it is a RAR, and it requires some degree of plume containment, we comply with it through pump and treat.	• Permits are not required (see CERCLA §121(e)(1)). Substantive requirements of the permit program are not applicable because there is no discharge. It is generally not a RAR if the plume is moving to parts of the aquifer that are also significantly contaminated. If it is a RAR, and it requires some degree of plume containment, we may comply with it by limiting natural attenuation to sites where the plume will not migrate into portions of the aquifer designated for drinking or other protected uses. Otherwise, we may use the interim action waiver, usually accompanied by institutional controls.	• May be a discharge; however, no permits are required under CERCLA §121(e)(1). If the substantive requirements of the permit program are ARARs, the action may comply if the contaminant levels of the effluent entering the ground water do not exceed the discharge standards set in the ROD (based on State permit requirements). Otherwise, we may use the interim action waiver.	• May be a discharge; however, no permits are required under CERCLA §121(e)(1). If the substantive requirements of the permit program are ARARs, the action may comply if the contaminant levels of the effluent entering the ground water do not exceed the discharge standards set in the ROD (based on State permit requirements). Otherwise, we may use the interim action waiver.

* This matrix provides general considerations only. Consult with ORC or OGC on specific applications.

** Relevant and Appropriate Requirement

MATRIX ANALYSIS OF STATE GROUND-WATER ANTIDEGRADATION REQUIREMENTS AS THEY PERTAIN TO CERTAIN REMEDIES AND SITE CIRCUMSTANCES*

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STATE LAW	GROUND-WATER REMEDIATION: PUMP AND TREAT (Aquifer With a Contaminated Moving Plume)	GROUND-WATER REMEDIATION: NATURAL ATTENUATION (Aquifer With a Contaminated Moving Plume)	SOIL REMEDIATION: SOIL FLUSHING (Where the Aquifer May or May Not Be Contaminated -- Followed by Pump and Treat)	SOIL REMEDIATION: SOIL FLUSHING (Where the Aquifer May or May Not Be Contaminated -- Concurrent With Pump and Treat)
3. The ground water must be protected. No discharge is permitted to a usable aquifer. RAR:** ground-water remediations that do not protect a usable aquifer are prohibited. This may occur if the remediation allows a contaminated plume to move.	• Requirement is not applicable if there is no discharge. If each reinjection constitutes a "discharge," the requirement is not applicable if the prior contamination already rendered the aquifer unusable. The requirement is not a RAR if the plume has rendered the aquifer unusable or if the plume is moving to parts of the aquifer that are also significantly contaminated. If it is a RAR, and it requires some degree of plume containment, we comply with it through pump and treat.	• Requirement is not applicable because there is no discharge. Also, the requirement is not applicable if the plume has rendered the aquifer unusable. The requirement may not be a RAR if the plume has rendered the aquifer unusable or if the plume is moving to parts of the aquifer already contaminated. If it is a RAR, and it requires some degree of plume containment, we may comply with it by limiting natural attenuation to sites where the plume will not migrate to usable portions of the aquifer. Otherwise, we may use the interim action waiver, usually accompanied by institutional controls.	• May be a discharge; however, the requirement is not applicable if the aquifer is not usable (e.g., because it is already contaminated). This requirement is probably applicable if the aquifer is pristine or slightly contaminated. If so, we may use the interim action waiver.	• May be a discharge; however, the requirement is not applicable if the aquifer is not usable (e.g., because it is already contaminated). If it is an ARAR, we may comply with it by simultaneously conducting pump and treat if the prompt containment and treatment of contaminants protects usable portions of the aquifer. Otherwise, we may use the interim action waiver.
4. The ground water must be protected. No discharge is permitted if it interferes with existing uses. RAR:** ground-water remediations that interfere with existing or potential uses are prohibited. This may occur if the remediation allows a contaminated plume to move.	• Requirement is not applicable if there is no discharge. If each reinjection constitutes a "discharge," the requirement is met if the existing uses(/quality) of the aquifer is maintained (e.g., where the aquifer is already contaminated). It would generally not be a RAR if the plume is moving to a portion of the aquifer that is already contaminated. If it is a RAR, and it requires some degree of plume containment, we comply with it through pump and treat.	• Requirement is not applicable because there is no discharge. It would generally not be a RAR if the plume is moving to a portion of the aquifer that is already contaminated. If it is a RAR, and it requires some degree of plume containment, we may comply with it by limiting natural attenuation to sites where contaminant levels are low and any plume migration will not affect the existing uses(/quality) of the aquifer. Otherwise, we may use the interim action waiver, usually accompanied by institutional controls.	• May be a discharge; however, the requirement is not applicable if the existing uses (/quality) of the aquifer is maintained (e.g., where the aquifer is already contaminated). This requirement is probably applicable if the aquifer is pristine or slightly contaminated. If so, we may use the interim action waiver.	• May be a discharge; however, the requirement is not applicable if the existing uses (/quality) of the aquifer is maintained (e.g., where the aquifer is already contaminated). This requirement is probably applicable if the aquifer is pristine or slightly contaminated. If so, we may use the interim action waiver.

* This matrix provides general considerations only. Consult with CERC or OGC on specific applications.

** Relevant and Appropriate Requirement

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STATE LAW	GROUND-WATER REMEDIATION: PUMP AND TREAT (Aquifer With a Contaminated Moving Plume)	GROUND-WATER REMEDIATION: NATURAL ATTENUATION (Aquifer With a Contaminated Moving Plume)	SOIL REMEDIATION: SOIL FLUSHING (Where the Aquifer May or May Not Be Contaminated -- Followed by Pump and Treat)	SOIL REMEDIATION: SOIL FLUSHING (Where the Aquifer May or May Not Be Contaminated -- Concurrent With Pump and Treat)
5. Maintain ground water at existing high quality unless the State Board approves the change to the water quality. [Statute requires groundwater maintenance at existing high quality during remediation. This may require containment of a contaminated moving plume.] RAR:** same as applicable.	• Requirement is not applicable if the ground water is not of high quality due to the contaminated plume. This requirement may be applicable if the aquifer is pristine or only slightly contaminated. If so, we may use the interim action waiver. It may be a RAR if the plume is moving to portions of the aquifer that are designated for drinking or other protected uses. If the requirement is a RAR, and it requires some degree of plume containment, we comply with it through pump and treat.	• Requirement is not applicable if the ground water is not of high quality due to the contaminated plume. If the requirement is a RAR, we may comply with it by limiting natural attenuation to sites where the plume contaminant levels are low and the plume will not migrate significantly. Otherwise, we may use the interim action waiver, usually accompanied by institutional controls.	• Requirement is not applicable if the ground water is already contaminated. This requirement may be applicable if the aquifer is pristine or only slightly contaminated. If so, we may use the interim action waiver.	• Requirement is not applicable if the ground water is already contaminated. This requirement may be applicable if the aquifer is pristine or only slightly contaminated. If so, we may use the interim action waiver.
6. Ground-water quality must be maintained commensurate with current uses. Statute requires maintenance of ground-water quality during remediation. This may require containment of a contaminated moving plume. RAR:** same as applicable.	• Requirement is presumably applicable. Requirement is met if the remedy maintains the current quality of the aquifer (e.g., where the reinjections at least meet current water uses(/quality) levels of the aquifer). If the requirement is an ARAR and it requires some degree of plume containment, we comply with it through pump and treat.	• Requirement is presumably applicable. Requirement is met if the remedy maintains the current uses(/quality) of the aquifer (e.g, where plume contaminant levels are low, there are small areas of contamination, and the plume will not migrate significantly). Otherwise, we may use the interim action waiver, usually accompanied by institutional controls.	• Requirement is presumably applicable. Requirement is met if the remedy maintains the current uses(/quality) of the aquifer (e.g., where the effluent at least meets the current water quality levels of the aquifer). Otherwise, we may use the interim action waiver.	• Requirement is presumably applicable. Requirement is met if the remedy maintains the current uses(/quality) of the aquifer (e.g., where the effluent at least meets the current water quality levels of the aquifer). Otherwise, we may use the interim action waiver.

* This matrix provides general considerations only. Consult with ORC or OGC on specific applications.

** Relevant and Appropriate Requirement